

Class ZOOPHYTA.

Order ACTINOIDA. Fam. LUCERNARIADÆ.

Genus LUCERNARIA (Müller).

L. campanulata (Lamx.).

A specimen of this species was obtained at Ilfracombe in August, by the Rev. Sir Christopher Lighton, who kindly gave it to me. It was about $1\frac{1}{4}$ inch in height, of a dull chocolate hue, in parts tinged with olive; in form a deep goblet with the cup slightly bell-shaped, the stalk slender, and the foot wide and thick: the groups of tentacles were contracted while I had it, the globose heads being crowded together, with no appearance of their slender pedicels. Between the tentacled eminences the spaces were rounded, and seemed as if the integument were a little turned over like a rim.

It was found attached to a sea-weed, but soon detached itself, and never afterwards adhered to anything: the only motion I observed in it was an occasional spasmodic bending-in of one or other of the tentacle-groups. After a day or two it became offensive, without losing its form, and was evidently dead and decaying.

EXPLANATION OF PLATE VIII.

- Fig. 1. *Pachygnathus notops*, magnified, dorsal surface.
 — 2. *Ibid.* the lip viewed from beneath.
 — 3. *Ibid.* the palpi and styliform mandibles.
 — 4. *Ibid.* an unguis.
 — 5. *Criothida thalassina*, magnified.
 — 6. *Acineta*, parasitic upon a marine Mite, magnified.
 — 7. *Crossostoma Midas*, nat. size, out of its tube.
 — 8. *Ibid.* magnified, viewed laterally, with a portion of its tube.
 — 9. *Ibid.* magnified, viewed dorsally, anterior portion.
 — 10. *Ibid.* a foot from near the middle.
 — 11. *Ibid.* the posterior extremity, and caudal styles.
 — 12. *Ibid.* a pencil of bristles.

 XXVIII.—On the Injurious Effects of an excess or want of Heat and Light on the Aquarium. By ROBERT WARINGTON, Esq.

TEMPERATURE is a point requiring great attention in carrying out successfully the principles of a permanent aquarium. The mean temperature of the ocean is estimated to be about 56° Fabr., and this, under ordinary circumstances, does not vary more than about 12° throughout the different seasons of the year. The causes of this equilibrium will be readily understood when we take into consideration the effects that must be produced by the

continued flux and reflux of the tides, and by the enormous streams of water which must be flowing from the Arctic regions from year's end to year's end in one constant current, and which, by their movement, must necessarily cause other currents to flow in and take their place, thus forcing, as it were, the heated surface-water of the tropical seas towards the colder regions of the globe. Again, the whole surface of the earth, submersed below the ocean, is protected by this fluid coating from the effects of the cooling influences of radiation on the one hand, and from contact with the currents of the atmosphere on the other; and hence we perceive an always existent cause for the maintenance of a steady, equable temperature by the waters of the ocean throughout the year.

Many of the inhabitants of the sea are very sensitive to changes of temperature, and we find that a few degrees of variation will cause them rapidly to move their position and seek some cooler or warmer spot as the case may be. In the ocean it will be evident that the creatures have the power readily to effect this under ordinary circumstances, by seeking deeper water not liable to be affected by atmospheric influences, by partially or entirely burying themselves in the sand or shingle, or by shielding their bodies under the protecting shadow of the rocks or growing vegetation. In arranging the rock-work in the interior of the aquarium, therefore, great care should be taken to keep these points in view, and to afford as much protection as possible to the creatures from the cooling influences of radiation on the one hand, and from the heat of the sun's rays on the other.

From my own experience I find that the range of temperature should not be below 50° Fahr., nor above 70°; within these limits all appears to progress healthily, but beyond these points many of the creatures are rapidly affected. During the last long-continued and severe winter, it was found very difficult, in an ordinary sitting-room having a south aspect and a good fire maintained throughout the day—the tanks being also screened at night by a blind,—to prevent the powerful cooling effects from radiation on a clear frosty night; and on three several occasions, marking exactly the three severest frosts that we experienced during the winter, the thermometer, immersed in an aquarium containing about thirty gallons of water, fell as low as 45° Fahr. The Shrimp and Crab tribes, and the Crustaceans generally, are especially affected by these changes, and on each of the three occasions alluded to, one or two individuals perished; the larger-sized Prawns, as *Palæmon serratus*, appeared to suffer more readily than the *P. squilla*, although this might arise from the smaller ones being able

to find a shelter from the radiation by concealing themselves more completely among the rock-work or vegetation. *Anthea cereus* is also very sensitive to considerable variations of temperature, falling from its foot-hold to the bottom of the tank apparently dead.

Excess of heat and also strong sunlight are likewise to be as carefully guarded against, and I may state as an evidence of this, that on a particularly hot day during the summer of 1854, being absent from home, the servant omitted to screen a small case from the sun's rays during the hottest period of the day, and on my return I found every creature dead. It contained an *Anthea cereus*, *Actinia dianthus*, two specimens of *Athanas nitescens*, and several others.

Too much light has also the effect of rapidly propagating several of the minute animalcules of a green colour, as the *Euglena* and its congeners, which under this influence multiply so rapidly as to render the whole water of a grass-green hue; this will at times subside to the lower part of the tank as evening approaches and disappear in the shingle bottom, but immediately the morning light shines strong upon the aquarium it will rise like a thin green cloud and diffuse itself throughout the whole of the water. Although this animalcular growth is not unhealthy, yet it causes the aquarium to present a very unsightly appearance, and prevents all observation on the habits of the inmates. The want of light, I need hardly observe, causes the rapid decay of the vegetation, and the products arising from this change are highly poisonous to animal life, the whole contents of the aquarium becoming of a black colour, and very soon of an offensive odour.

Apothecaries' Hall, Sept. 11, 1855.

XXIX.—*On the Mechanism of Aquatic Respiration and on the Structure of the Organs of Breathing in Invertebrate Animals.*
By THOMAS WILLIAMS, M.D. Lond., F.L.S., Physician to the Swansea Infirmary.

[With a Plate.]

[Continued from vol. xiv. p. 262.]

Gasteropoda.

It is now proposed to inquire into the structure of the organs of breathing in that multitudinous group of mollusks which lies above the Lamellibranchiata, constituting literally a great sub-kingdom; it will be impossible within the limits of this memoir